Methodology to establish SDG 3 targets

and reduce inequalities.

2021

3 GOOD HEALTH AND WELL-BEING

SUSTAINABLE DEVELOPMENT GOAL Nº 3

Guarantee a healthy live and promote well-being for all at all ages.

The methodology proposed below presents an algorithm (so called *target achievement algorithm*, TAA) designed to simultaneously set quantitative targets for the national average of an SDG3 health indicator and for reduction of its geographic inequality gaps. The methodology requires relevant data disaggregated geographically at the subnational level (e.g., departments, states, provinces, municipalities, cantons, districts, etc.). The algorithm presented assumes a criterion of proportional progressivity in the speed of change of the indicator in question and generates internally consistent average and inequality gap targets, facilitating monitoring and accountability on commitment to leave *no one behind.*

Methodological synthesis:

If there is available information on a health indicator (HI) at two set times, t_0 and t_1, it is possible to calculate its Average Annual Percentage Change (AAPC) by applying the following expression:

$$AAPC = \frac{\ln(HI_{t1}) - \ln(HI_{t0})}{(t_1 - t_0)} \times 100 \quad \textbf{(1)}$$

In general terms, the value obtained with expression (1) – AAPC – reflects the rate of change of a health indicator over time. If the health indicator has **negative** polarity (i.e., when a lower value of the health indicator over time indicates a more favorable situation, e.g., mortality rate), the AAPC reflects the average annual percentage **decrease**.

If, on the other hand, the health indicator has **positive** polarity (i.e., when a higher value of the health indicator over time indicates a more favorable situation; e.g., care coverage), the AAPC reflects the average annual percentage **increase**.

Assuming that for a health indicator its AAPC and a value of the indicator at a baseline time, b_t, are known, the value of the health indicator at future time, f_t, can be estimated by applying the following expression:

$$HI_{t_f} = HI_{t_i} \times \exp\left[\left(\frac{AAPC}{100}\right) \times \left(t_f - t_i\right)\right] \quad \textbf{(2)}$$

The estimation of a health indicator at future time can be expressed in **relative** terms (i.e., as a percentage of the value at baseline), which can be done by making use of the expression for the percentage change (PC) of the indicator between baselinel (t_b) and future time(t_f), as follows:

$$PC = \frac{HI_{t_f} - HI_{t_b}}{HI_{t_i}} \times 100 \quad \textbf{(3)}$$

The absolute gap (AG) and the relative gap (RG) are simple summary measures of health inequality and correspond to the arithmetic difference and the arithmetic quotient, respectively, in the value of the health indicator between two extreme groups of geographic stratification. If there are, for example, four geographic strata ordered by some health indicator, the geographic inequality gap metrics are calculated according to the following expressions:

$$AG = HI_{q1} - HI_{q4} \quad \textbf{(4)}$$

$$RG = \frac{HI_{q1}}{HI_{q4}} \quad \textbf{(5)}$$

where q_1 is the first stratum (corresponding to the stratum with the worst IS) and q4 is the fourth stratum (corresponding to the stratum with the best HS). AG is expressed in the same measurement units as the health indicator; AG=0 denotes absence of inequality. RG is expressed without measurement units (i.e., its value represents the number of times the numerator is contained in the denominator); RG=1 denotes absence of inequality.

Target Achievement Algorithm:

Step 1:

Calculate the national AAPC of an SDG 3 indicator from a known time series between baseline time and a reference year, applying expression (1).

Step 2:

Define the geographic strata.

1. order the geographic values of the health indicator at baseline time according to its polarity (i.e., from highest to lowest if it has negative polarity; from lowest to highest if it has positive polarity).

2. identify the cut-off points that define the geographic strata; either by pre-established categories (e.g., above and below an established national reference value) or by quantile groups (e.g., quintiles, quartiles or tertiles).

3. calculate the (weighted) average health indicator for each geographic stratum so defined.

Step 3:

Apply the AAPC proportional progressivity criterion to each defined geographic stratum.

1. if the health indicator has negative polarity, assign a proportionally higher AAPC the higher the health indicator of the stratum, guided by the proportionality factor.

2. if the health indicator has positive polarity, assign a proportionally higher AAPC the lower the health indicator of the stratum, guided by the proportionality factor.

3. in any case, ensure that the arithmetic average of the AAPCs of all strata is equal to the national average AAPC at baseline time (applied in Step 1).

Step 4:

Define targets at the subnational and national levels.

1. calculate the value of the health indicator at a future time for each territorial unit (subnational target), applying expression (2).

2. calculate the weighted average of the health indicator values in all territorial units at a future time (national target).

3. these results represent the subnational and national targets for the SDG 3 indicator in absolute terms. Applying expression (3} yields targets in relative terms.

Step 5:

Define goals for reducing geographic inequality gaps.

1. calculate AG and RG by applying expressions (4) and (5) at baseline and future times.

2. obtain the percentage changes of AG and RG in the period by applying expression (3).

3. these results represent the targets for reducing geographic inequality gaps in the SDG 3 indicator (distributional targets) in absolute and relative terms, respectively.
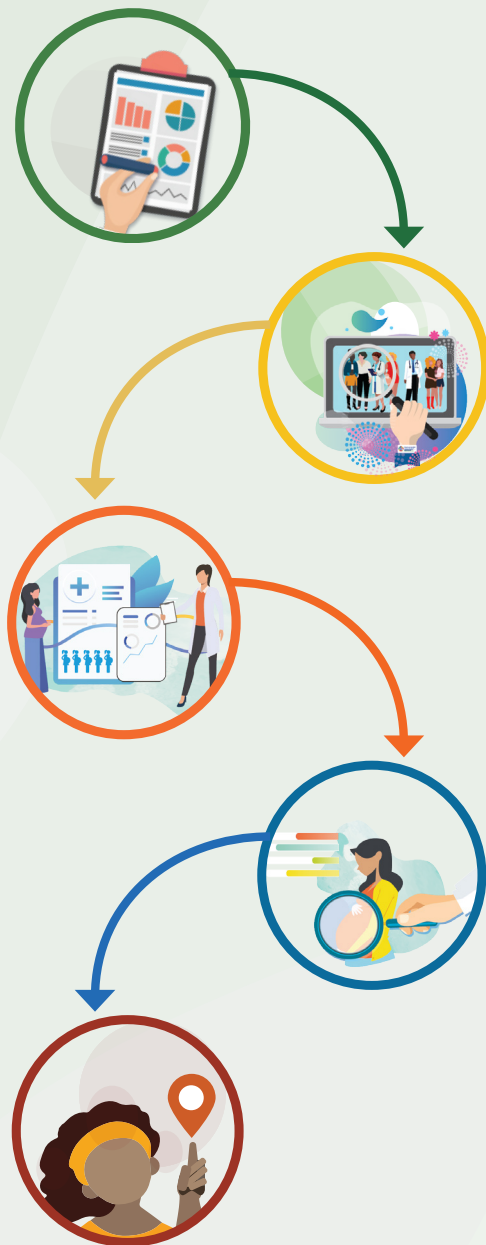
Application of the algorithm for obtaining targets:

Data presented in this application were used to construct the **profile of inequalities in women's, children's and adolescent's health** developed by Guatemala (https://www.everywomaneverychild-lac.org/e/countries/). The example considered here corresponds to the maternal mortality ratio (MMR), which expresses the number of maternal deaths per 100,000 live births in a given year. According to **Step 1** of the TAA, the national AAPC of MMR was calculated from the data of MMR in 2009 (140 maternal deaths per 100,000 live births) and MMR in 2014 (113 maternal deaths per 100,000 live births), which correspond to the national average for those years; replacing these values in expression (1):

$$AAPC = \frac{\ln(113) - \ln(140)}{(2014-2009)} \times 100 = -4{,}3\%$$

The first numerical column of **Table 1** shows MMR values in 2014 by Departments of Guatemala, ordered from highest to lowest. According to **Step 2**, it is based on this ordered geographic distribution of the baseline MMR that groups of departments or geographic strata are to be identified in order to establish the contribution of subnational levels to the 2030 MMR target.

Table 1: Guatemala: baseline subnational maternal mortality ratio (MMR) values and departmental targets to 2030.

Departments	MMR, 2014	MMR, 2030
Huehuetenango	232.6	88.7
Totonicapán	167.7	63.9
Quiche	162.0	61.8
Petén	149.7	57.1
Sacatepequez	138.5	62.0
Izabal	131.8	59.0
Chiquimula	130.6	58.5
Chimaltenango	129.2	57.9
San Marcos	127.8	57.2
Alta Verapaz	123.9	55.5
Jalapa	114.0	51.0
Sololá	97.9	60.5
Baja Verapaz	97.9	60.5
Quetzaltenango	85.0	52.5
Jutiapa	74.3	45.9
Santa Rosa	71.9	44.4
Escuintla	65.3	40.3
Suchitepequez	62.1	38.3
Retalhuleu	59.5	36.7
Guatemala	48.0	34.8
Zacapa	31.6	22.9
El Progreso	23.4	17.0

In this application, four departmental groups were normatively established according to the magnitude of their MMR in 2014. These four geographic strata were defined based on two criteria: on the one hand, a national MMR reference value for 2030 calculated from the national AAPC (-4.3%) and the baseline national MMR (113 maternal deaths per 100,000 live births) by applying expression (2) and, on the other hand, a maximum allowable threshold, equivalent to twice the global SDG 3 target for this indicator (140 per 100,000 live births). Thus, the four strata group the departments above the maximum threshold (group 1), below it but above twice

the national benchmark (group 2), below twice the national benchmark but above it (group 3) and below the national benchmark (group 4).

Based on the algorithm **Step 3**, each of these four geographic strata was assigned a different AAPC intensity, following a criterion of proportional progressivity: it is considered that the higher the departmental MMR, the higher the speed of its reduction (i.e., the AAPC) should and could be, while the lower the MMR, the lower the AAPC assigned should be (this behavior obeys the so-called **principle of diminishing returns**). Table 2 presents the geographic strata defined by applying the criteria established in this application, as well as the AAPC values assigned to each of these four groups. Note that the average group AAPC is equal to the national average AAPC obtained in **Step 1**.

Table 2: Departmental strata and their AAPC levels, according to MMR values in 2014.

Geographic strata	Classification criteria (cut-off points)	AAPC (*)
Group 1	Departments with RMM ≥ 140	-6.4
Group 2	114≤ Departments with RMM< 140	-5.4
Group 3	57≤ Departments with RMM< 114	-3.2
Group 4	Departments with RMM< 57	-2.1

(*)   the average of these values equals -4.3, which corresponds to the national CPAP calculated in Step 1..

By extension, if one considers the baseline MMR levels (i.e., in 2014), the AAPC values of each geographic stratum (presented in Table 2) and uses expression (2), it is possible to obtain the MMR target that each department of the country should reach in 2030, as presented in the second numerical column of Table 1.

From the algorithm **Step 4**, as the new MMR departmental distribution to 2030, the value of the national MMR was calculated, expressed as an average weighted by the size of the population of live births in each department (projected to 2030); this weighted average represents in absolute terms the national target, which is equal to 53 maternal deaths per 100,000 live births in 2030. In relative terms, the national target is expressed as a 53% reduction in the national MMR between 2014 and 2030.

Finally, from the algorithm **Step 5** with the baseline and target year MMR values corresponding to strata 1 and 4 (i.e., the extreme strata of the abbreviated distribution), the respective inequality gaps (absolute and relative) were calculated using expressions (4) and (5).

Table 3 presents in a summary table the baseline values as well as the joint targets for reducing the national average and for reducing the absolute and relative geographic inequality gaps in the country's maternal mortality ratio by 2030:

1. in absolute terms, a national target of 53 maternal deaths per 100,000 nv by 2030 or, in relative terms – according to expression (3) – a 53.0% reduction in MMR between 2014 and 2030;

2. a 72.0% reduction target in the absolute MMR gap between 2014 and 2030; and,

3. a 47.0% reduction target in the relative MMR gap between 2014 and 2030

Table 3.   Maternal mortality ratio (MMR) in Guatemala: national average and absolute and relative inequality gaps in 2014 and targets to 2030.

metrics-summary	2014	2030	CP (%)
National MMR average	113	53.3	-53.0
Absolute MMR gap in	154.9	43.4	-72.0
Relative MMR gap in the	4.2	2.3	-47.0